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# The Moderating Influence of Personality and Situational Variables on the Effect of Recommendation Agents on Perceived Decision Quality and Perceived Information Quality

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## ABSTRACT

The proposed study provides a broader conceptualization of Recommendation Agent (RA) functionalities in the e-commerce context and tests the moderating effects of three individual traits, *perception style*, *judgment style* and *category knowledge* on two search outcome variables: *perceived information quality* and *perceived decision quality*. The moderating effect of a situational variable, *product complexity*, is also considered on the relationships between RA functionalities and search outcomes. Finally, the relevance of the findings of our proposed study to both researchers and practitioners in the field of e-commerce are discussed.

## Keywords

Recommendation agents, e-commerce, perception style, judgment style, product category knowledge, product complexity, information search outcomes.

## INTRODUCTION

One of the primary characteristics of electronic commerce is the reduction of consumer information search costs (Bakos, 1997). For retailers, websites act as a valuable channel that provides information and facilitates transactions (Bellizzi, 2000). Hence, it makes business sense to tailor the presented information to the customer's preferences.

Customers' Internet experiences can be made more satisfying by customizing the amount and display/format of the provided information (Huffman and Kahn, 1998; Ho and Tam, 2005). Website functionalities that reduce cognitive burden can lead to more positive online shopping experiences for their customers. Huffman and Kahn (1998) found that users who could control the format of the information displayed experienced greater satisfaction and learning. They also perceived the processing of the various alternatives as less complex. Reibstein (2000) found that customers at a retailer's website reported higher levels of satisfaction when they could sort the results based on criteria that they considered important. Ariely (2000) showed that providing consumers with control over the order, content, and duration of presentation of product-relevant information increased the perceived value of the displayed information.

Functionality available at a retailer's website should reduce the complexity of information needed to make shopping-related decisions (e.g., going to a different website, or looking further at a set of smaller set of products). Haubl and Trifts (2000) found that both the quality and efficiency of purchase decisions improved when functionalities allowing for screening alternatives (termed a recommendation agent, RA) and organizing product information (termed a comparison matrix) were provided. Specifically, they suggested that the effort a user perceives as necessary to process the presented information could affect both the decision to buy (or continue shopping) and the quality of that decision. Garbarino and Edell (1997) found that cognitive effort influences the choice of more difficult-to-process alternatives: customers experienced greater negative effect when they perceived that the processing of various presented alternatives required greater cognitive affect.

The resulting negative affect was found to lead to lower intentions to buy. In sum, the provision of effort-reducing website functionalities may benefit both the shoppers (by facilitating choice of better alternatives) as well as retailers (by leading to more positive customer experiences which subsequently could lead to immediate purchases and website loyalty).

An important part of website functionalities is the provision of *Recommendation Agents* (RA), a set of functionalities that assist the user to filter and sort product information by using user-relevant criteria (Haubl and Trifts, 2000; Swaminathan 2003). Swaminathan (2003) operationalized RAs as: a) prioritizing the displayed results based on top attributes, and b) limiting the total number of alternatives displayed. She evaluated the moderating effects of product complexity, product knowledge and category risk on the relationship between the use of an RA, decision quality, and amount of search. She found that RA functionalities improved decision quality and decreased the amount of search. The results were stronger when the product was more complex, the customer had lesser product knowledge, and product category risk was higher. Tam and Ho (2005) found that a personality variable, *need for cognition*, significantly moderated the effect of a recommendation functionality, *preference matching*, on the overall elaboration of the displayed information and the acceptance of the recommended alternative.

Given the findings reported in extant literature, further investigation of the effects of RAs on various information search related outcomes is warranted. We propose one such study.

## RESEARCH MODEL

Next, we present an overview of our theoretical model and explain how it will be tested in our study.

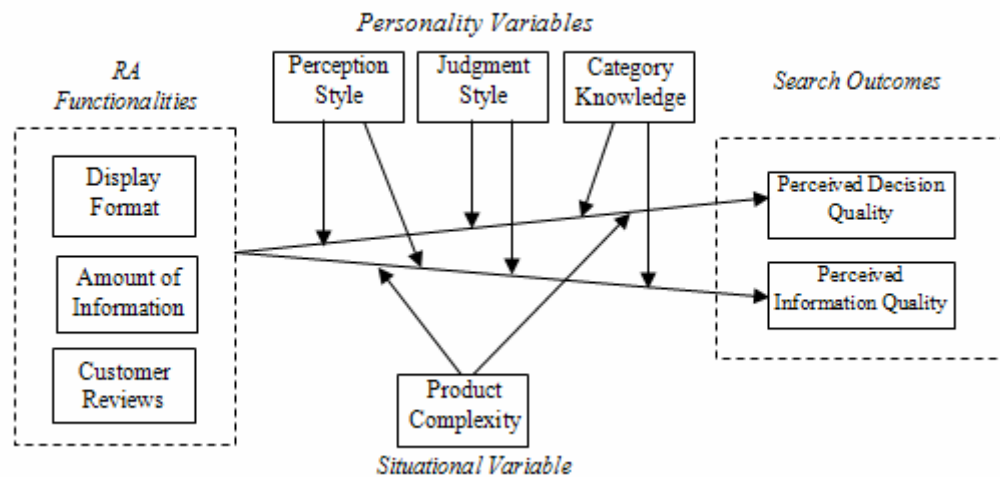


Figure 1. Research Model

**Recommendation Agents:** Building on prior conceptualizations of RAs, we extend the description of an RA to include the following functionalities:

- *Display format:* The displayed information can be sorted based on a single or multiple attributes (Haubl and Trifts, 2000).
- *Amount of information:* The number of displayed product attributes can be changed, ranging from a few basic attributes (e.g., price and brand name) to more advanced displays of more (and typically more technical) attributes (e.g., for a digital camera: focus power, display resolution, battery life, etc.). For example, the user may be able to choose among three different levels of displayed information (say, simple: 2 attributes; intermediate: 5 attributes; and advanced: 8 attributes).
- *Customer Reviews:* Each product displayed is accompanied by reviews provided by previous product users. These can be sorted based on usefulness (say, a summated average of the product's overall user ratings), date when review was posted, self-reported expertise level of the rater, and even the review's assessment rating of subsequent users).

The first two RA functionalities will be experimentally manipulated by the presence/absence of their corresponding customization. E.g., in the control condition for *display format*, users will be unable to sort the displayed information; in the experimental condition, the capability to perform a multi-attribute sort of the information is provided. The third RA,

Customer Reviews, will be manipulated by the presence or absence of the average of evaluative product ratings provided to the website by previous users.

**Personality:** Individuals differ in their specific ways of gathering and evaluating information. Henderson and Nutt (1980), and Doktor and Hamilton (1973), found that, when it comes to overall decision-making style, individuals have a preference that remains fairly consistent across situations. In this study, we look at two personality traits from the Myers Briggs Type Indicator (MBTI) instrument (Myers et al, 1998, Quenk, 2000) that affect the two primary mental activities involved in web-based commerce: information acquisition and decision making.

Briggs Myers and Myers (1995) propose that individuals have preferred (dominant) modes of information collection and evaluation. In information acquisition, individuals are seen as having a preference for a *perception style* that ranges between *sensation* to *intuition*. *Sensation*-dominant individuals tend to focus on facts and details, seeking alternatives that are unambiguous. *Intuition*-dominant individuals, tend to look beyond facts, avoid the effort needed to process information and instead speculate what an alternative might mean.

In information evaluation, individuals are seen as having a preference for *judgment style*, which ranges between *thinking* and *feeling*. *Thinking*-dominant individuals tend to systematically and logically evaluate the information available before reaching a conclusion while *feeling*-dominant individuals tend to use value judgments (e.g., good/bad, pleasant/unpleasant) to evaluate alternatives (Mason and Mitroff, 1973). Even though individuals may shift effortlessly from sensation to intuition or from thinking to feeling, most individuals have a strong preference for one style over the other. In this study we propose that these two personality variables moderate the influence of RA functionalities on outcome variables

**Product Knowledge and Product Complexity:** Consistent with Swaminathan (2003), we use a situational variable, product complexity, and an individual difference variable, product category knowledge, and suggest that they moderate the relationship between RA functionalities and the outcome variables. Specifically,

- *Category knowledge* is defined as the amount of prior information a customer has about a product category
- *Product complexity* is operationalized as the number of product attributes needed to make a well-informed decision

**Outcome Variables:** In this study, we consider two dependent variables often used to capture the subjectively perceived quality of a decision (which may also be developed into a second-order factor).

- *Perceived decision quality* is defined as the customer's confidence in the final choice decision product and is operationalized by measuring the perceived confidence and perceived accuracy of the decision made. (cf., Ariely, 2000, and a six-item scale adapted from Dooley and Fryxell, 1999).
- *Perceived information quality* captures the belief that the information displayed is relevant, accurate, current, coherent, in a suitable format, and valid (adapted from Miller, 1996)

## HYPOTHESES

The degree of cognitive effort required to evaluate and choose a product depends on the amount of information provided to the consumer (Payne et al, 1988). An RA that can present only the required amount of information in the most suitable format will lessen the customer's cognitive burden (Haubl and Trifts, 2000). This facilitating ability of an RA will be more noticeable when the amount of information needed for processing before making a choice is greater. For less complex items, i.e., those that do not have several attributes or about which the customer has a high degree of knowledge, the use of an RA will not significantly alter perceived decision quality. This is because the consumer already knows what s/he would like to buy and thus believes that there is little need to consider other/several alternatives. Therefore, lower product-complexity products or more knowledgeable consumers are likely to decrease the effects of RA functionalities on the outcome variables. Specifically,

- H1. RA functionalities will increase perceived decision quality and perceived information quality when
- H1a) product complexity is high
- H1b) category knowledge is low

Customers of different perceiving and judging styles can be expected to vary in their perceptions and use of specific RA functionalities. *Sensation*-dominant customers would seek as much information as possible before moving on to the next evaluation step. Thus, their perceptions of decision quality and information quality would be accentuated by the functionalities of the RA. In contrast, *intuition*-dominant customers, who are not particularly interested in actively seeking information, are less likely to be affected by the functionalities of the RA. Thus,

*H2a. RA functionalities will increase perceived decision quality and perceived information quality especially for sensation- dominant subjects.*

*H2b. RA functionalities will decrease perceived decision quality and perceived information quality for intuition-dominant subjects.*

Similarly, *feeling*-dominant customers who typically rely on evaluative judgments would find product summated evaluative ratings and reviews more helpful than objectively-described products attributes. On the other hand, *thinking*-dominant customers, who rely primarily on objective product attribute descriptions, would rely on objective attribute information. Thus, a *feeling*-dominant customer can be expected to be more influenced by evaluative product reviews (i.e., summated averages) than a *thinking*-dominant customer (who would be more influenced by objective attribute information). Thus, we posit that:

*H3a: Display Format and Amount of Information functionalities will increase levels of perceived information quality and perceived decision quality especially for thinking-dominant subjects.*

*H3b: The presence of the customer-provided summated product averages will increase levels of perceived information quality and perceived decision quality especially for feeling-dominant subjects.*

## METHODOLOGY

Our proposed model (Figure 1) is tested with a 2X2X2X2 factorial design experiment. The first three factors pertain to the presence/absence for RA functionalities (*Display Format*, *Amount of Information* and *Customer Reviews*). The low level of *Product Complexity*, describes either simpler products (those requiring a few attributes to make a well-informed decision) or complex products. *Category knowledge* is measured using *objective knowledge* (combination of number of brand name recalls and short answer definition of product functions) and *subjective knowledge* (product familiarity, product knowledge, and usage; Cowley and Mitchell, 2003). *Perceived Decision Quality* and *Perceived Information Quality* will be measured by a series of scales previously employed in the decision-making literature (adapted from Miller, 1996, Ariely, 2000 and Dooley and Fryxell, 1999). Finally, the two personality traits will be measured using the MBTI instrument (Myers et al. 1998).

## CONCLUSIONS

The proposed study contributes to a growing body of research pertaining to the effects of various RA functionalities on different search outcomes. Seeking and perusing information about different products is an important step that precedes a customer's decision to make a purchase at a retailer's website (Haubl and Trifts, 2000). Our study contributes to an understanding of this process by looking at some of the key website-related, personality and search outcome-related variables associated with this step.

While we recognize that prior research (e.g., Tam and Ho, 2005) has considered the moderating effects of another personality variable, *need for cognition*, we believe that information acquisition and processing are better captured by the *perception style* and *judgment style* personality constructs. Thus, we expect the findings to broaden the scope of interactions between features of RAs and personality dimensions most relevant to information gathering and evaluation. Several retailers in their websites are increasingly incorporating RA functionalities; our findings will be of practical importance to the designers of such websites by informing them about the potential benefits, if any, of the RA functionalities studied here.

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